CLAIMS

1. Method for specific detection of one or more analytes in a sample, comprising the steps of:

specifically associating any said one or more analytes in said sample with a scattered-light detectable particle,

illuminating any said particles associated with said analytes with light under conditions which produce scattered light from said particle and in which light scattered from one or more said particles can be detected by a human eye with less than 500 times magnification and without electronic amplification, and

detecting said light scattered by any said particles under said conditions as a measure of the presence of said one or more analytes.

2. The method of claim 1 wherein said particle has a size suitable for producing a specific colored light when observed by said human eye and illuminated with white light.

3. The method of claim 2 wherein the color of said specific colored light provides a measure of the presence or amount of said one or more analytes.

4. The method of claim 1 wherein said detecting comprises measurement of the intensity of scattered light as a measurement of the concentration of said one or more analytes.

5. The method of claim 1 wherein said detecting comprises measurement of the color of scattered light as a measurement of the concentration of said one or more analytes.

6. The method of claim 1 wherein said particle has a composition suitable for producing a specific colored light when observed by said human eye and illuminated with white light.

7. The method of claim 1 wherein said particles are associated with a solid phase bound analyte.

8. The method of claim 1 wherein said particles are in a liquid phase during said detecting step.

9. The method of claim 1 wherein said analyte is bound to a solid phase.

10. The method of claim 1 wherein said analyte is free in liquid solution.

11. The method of claim 1 wherein said sample is a microarray or array chip comprising discrete areas each of which may contain said one or more analytes.

12. The method of claim 1 wherein said light is polychromatic white light.

13. The method of claim 1 wherein a monochromatic light illumination source is used to provide said light.

14. The method of claim 1 wherein said method comprises providing a plurality of different particles each having a different visual appearance when observed by said human eye.

15. The method of claim 1 wherein said particles are used in a homogenous assay and wherein two or more particles are brought sufficiently close together so that the light scattering property of any one particle is altered, wherein said alteration is a measure of the presence of said one or more analytes.

16. The method of claim 1 wherein said particles are used in a assay and wherein two or more particles are brought sufficiently close together so that the light scattering property of the two or more particles can be resolved from single particles and said light scattering is a measure of the presence of said one or more analytes.

17. The method of claim 1 wherein said particles are used in a homogeneous assay and wherein two or more particles are brought sufficiently close together so that the light scattering property of the two or more particles can be resolved from single particles and said

light scattering is a measure of the presence of said one or more analytes.

18. The method of claim 1 wherein said particles are used in a homogeneous assay and wherein two or more particles that are held in close proximity to one another are caused to be separated so that the light scattering property of any one particle is altered, wherein said alteration is a measure of the presence of said one or more analytes.

19. The method of claim 1 wherein said particles are used in a homogeneous assay and wherein two or more particles are linked together by one or more molecular interactions, wherein the molecular interaction holding the particles together is disrupted so that one or more particles is released from the molecular interaction, wherein said release is a measure of the presence of said one or more analytes.

20. The method of claim 1 wherein said particle is a gold or silver particle.

21. The method of claim 1 wherein said particle has a size between 1 and 500 nanometers inclusive.

22. The method of claim 1 wherein said light is directed toward said particle by a prism or other light guide system.

23. A population of specifically detectable metal-like light scattering particles formed from at least one light scattering material, said particle comprising at least one additional material on its surface to provide chemical stability and an ability to said particle to bind to an analyte, wherein said population of particles is adapted to sufficient homogeneity in size so that one or more specific light scattering properties of the individual particles in said population are similar from particle to particle.

24. The particle of claim 23 wherein said particles are formed from a material selected from the group consisting of metal, metal compound, metal oxide, semiconductor, and superconductor.

25. The population of claim 23 wherein said particles are formed of a mixed composition comprising a metal-like material as one part of said composition.

26. A specifically detectable light scattering particle reagent formed from at least one light scattering material selected from the group consisting of a metal, a metal compound, a metal oxide, a semiconductor, and a superconductor having a diameter between 1 and 500 nanometers wherein said particle reagent comprises a base molecule adapted to bind to the surface of the particle and adapted to bind to a binding agent, said particle reagent capable of binding to an analyte.

27. The population or particle of claim 23 or 26 wherein said particles have a coat selected from the group consisting of a polymer, an inorganic material, an organic material, a proteinaceous material, a base molecule material, and a binding agent.

28. The population or particle of claim 23 or 26 wherein said particles are spherical.

29. The population or particle of claim 28 wherein said particles are oval or ellipsoidal.

30. The population or particle of claim 29 wherein said particles are asymmetrical.

31. The population or particles of claim 23 or 26 wherein said particles have a size distribution with a coefficient of variation less than 5%.

32. The population or particle of claim 23 or 26 wherein said particles have a size distribution with a coefficient of variation of less than 10%.

33. The population or particle of claim 23 or 26 wherein said particles have a size distribution with a coefficient of variation of less than 15%.

34. The population of claim 23 wherein said particles comprise gold.

35. The population of claim 23 wherein said articles comprise a mixed composition of gold and silver.

36. The population of claim 23 wherein said particles are composed of silver and a magnetic or ferro electric material.

37. The population of claim 23 wherein said particles are composed of gold and a magnetic or ferro electric material.

38. The population of claim 23 wherein said particles are composed of a mixture of metal-like materials and a magnetic or ferro electric material.

39. The population of claim 23 wherein said particles are composed of gold with a surface coating selected from the group consisting of polymer, protein, nucleic acid inorganic compound and organic compound, base material molecule, binding agent, and wherein said particles have a diameter of between 10 and 50 nanometers inclusive and produce a green scattered light when illuminated with white light.

40. The population of claim 23 wherein said particles are composed of gold with a surface coating selected from the group consisting of polymer, protein, inorganic compound and organic compound, base material molecule, binding agent, and the diameter of said particles are between 50 and 70 nanometers inclusive and

produces a yellow-green to yellow-scattered light color when illuminated with white light.

41. The population of claim 23 wherein said particles are composed of gold with a surface coating selected from the group consisting of polymer, protein, inorganic compound, an organic compound, base material molecule, binding agent, and said particles have a diameter between about 70 and 120 nanometers and produces an orange to orange-red scattered light color when illuminated with white light.

42. The population of claim 23 wherein said particles are composed of gold with a surface coating selected from the group consisting of polymer, protein, inorganic compound, an organic compound, base material molecule, binding agent, and said particles have a diameter of greater than 120 nanometers and less than one micron and produces an orange to orange-red scattered light color when illuminated with white light.

43. The population of claim 23 wherein said particles are composed of silver with a surface coating selected from the group consisting of polymer, protein, inorganic compound, an organic compound, base material molecule, binding agent, and said particles have a diameter between about 5 and 50 nanometers and produces a blue scattered light color when illuminated with white light.

44. Apparatus for analysis of a solid phase sample, comprising:

a light source angled such that light is delivered to said sample and the scattered light from any particles bound to said sample can be maximally detected, wherein said apparatus is constructed and arranged such that any said particles associated with said sample can be illuminated with said light under conditions which produce scattered light from said particles and in which light scattered from one or more said particles can be detected by a human eye with less than 500 times magnification and without electronic amplification.

45. The apparatus of claim 44 wherein a collection lens detector is placed outside the intensity envelope of the forward direction of scattered light from said sample.

46. The apparatus of claim 44 comprising a particle counter having necessary computer software or firmware configured and arranged to detect said scattered light.

47. The apparatus of claim 44 wherein a collecting lens is provided in said apparatus essentially perpendicular to the surface upon which said sample is to be applied.

48. The apparatus of claim 44 wherein said apparatus is constructed and arranged to allow assay of a

microarray wherein each separate area of said microarray has a dimension between ten square microns and one square millimeter.